

REMARKS/ARGUMENTS

Applicants have carefully reviewed the Final Office Action dated April 6, 2005. Reconsideration of the Examiner's rejection of the claims in their amended form is respectfully requested. A total of 26 claims remain in the case. Claim 1 is currently amended further to more clearly define the invention. Claim 2 is cancelled without prejudice. Claim 26 was amended previously. Claims 6 and 9 are amended to refer to "said blowing agent" which was first introduced in claim 1. Claims 3-5, 7, 10-25 and 49 remain as originally filed.

Amended claim 1 now recites that the foamed cellular particles are pre-expanded particles which are formed from expandable polymer particles and that the blowing agent in these foamed cellular particles is an organic blowing agent in an amount ranging between 2.5 and 5.0 weight percent. This latter characteristic of the foamed cellular particle having a blowing agent in an amount ranging between 2.5 and 5.0 weight percent was presented in original claim 2, which is presently cancelled. Claim 1 is also amended to point out the fact that the foamed cellular particles (pre-expanded particles) are formed from expandable particles and that these pre-expanded particles are subjected to further expansion in a molding process used to form an article, whereby the equipment used in this molding process is conventional equipment.

Claims 27-48 and 50 had been withdrawn in view of a restriction requirement. Claims 27, 29 and 30 are amended herein to be commensurate with the amended claims of this case. Applicants respectfully request that these withdrawn claims 27-48 and 50 be rejoined in this application.

Claim Rejection Under 35 U.S.C. 102 (a) or 103 (a)

Claims 1-26 and 49 are rejected under 35 U.S.C. 102 (a) as being anticipated by, or, in the alternative, under 35 U.S.C. 103(a) as obvious over WO 00/15703 to NOVA Chemicals.

The rejection of the claims stands as per the reasons set forth in the Office Action dated August 20, 2004. In this Final Office Action dated April 6, 2005, the Examiner states:

"Newly added limitation to the properties of the claimed foamed particles i.e., the ability of the claimed particles to be expanded to [a] certain density in conventional equipment without being additionally impregnated with blowing agent are inherently met by the foamed particles disclosed by NOVA. It appears that the claimed property is inherently exhibited by the disclosed particles because the disclosed particles are made from substantially the same materials, in the same proportions and by similar methods as the claimed particles. Moreover, the reference expressly states that the pre-expanded particles may be further expanded to up to three times the density of the pre-expanded particles without being impregnated with additional blowing agent. Since the pre-expanded particles have density as low as  $200\text{kg/m}^3$ , expansion of such particles three times inherently results in expanded particles with the density substantially lower than the upper claimed invention. The burden is shifted to the applicants to provide factual evidence to the contrary, i.e. that the particles disclosed by the reference and containing the disclosed amounts of the blowing agent (2 or 4%) are not inherently capable of being expanded to the claimed density in any

conventional equipment at any conventionally used conditions."

Applicants emphasize that "the ability of the claimed particles to be expanded to a certain density in conventional equipment without being additionally impregnated with blowing agent" is not inherently met by the foamed particles disclosed by NOVA in that the disclosed particles of WO 00/15703 are not made from substantially the same materials in the same proportions.

Both the claimed particles of the invention and the disclosed particles of WO 00/15703 can be made from the same material, e.g. polystyrene, and both the claimed particles and the disclosed particles are pre-expanded initially to a density which is at most 3 times lower than the original density of the particles. However, the amount of organic blowing agent incorporated in the expandable particles used in the invention and those used in the particles of WO 00/15703 differs substantially. Therefore, the amount of organic blowing agent remaining in the claimed particles and in the cited prior art particles differs substantially.

The porous particles of WO 00/15703 are prepared by first making expandable particles containing from 0.5 to 4.0%, preferably 0.5 to 2.0%, by weight of an organic blowing agent, e.g. pentane. These expandable particles are then pre-expanded to form the porous particles having a density, which is at most 3 times lower than the original density of the particles. These porous particles contain 2.0% by weight or less, and preferably, 1.5% by weight or less, and most preferably, less than 1.0% by weight of an organic blowing agent, e.g. pentane.

The disclosure of WO 00/15703 distinctly teaches this and the Examples illustrate this.

That is, Example 1 discloses that the pre-expanded particles had a pentane content of 1.77% by weight and a water content of 0.2% by weight. Example 2 discloses that the pre-expanded particles had a pentane content of 1.92% by weight and a water content of 0.1% by weight. Example 3 discloses that the pre-expanded particles had a pentane content of 1.77% by weight and a water content of 0.1% by weight. Example 4 discloses that the pre-expanded particles had a pentane content of 1.1% by weight and a water content of 0.1% by weight. Example 5 discloses that the expandable polystyrene particles had a pentane content of 1.66% by weight and that the pre-expanded particles had a pentane content of 1.29% by weight. Example 6 discloses expandable polystyrene particles that contain 2.6% by weight water (not pentane). The comparative example discloses expandable polystyrene particles containing 6.2% by weight pentane. These expandable particles are expanded not to a density which is at most 3 times that of the original density of the expandable particles, but are expanded to a ratio of 34.9 ( $520 \text{ kg/m}^3$  divided by  $14.9 \text{ kg/m}^3$ ), and these expanded particles have a pentane content of 5.9% by weight.

Applicants believe that in the reasons for the rejection of the claims the Examiner seems at times to be confusing "expandable particles" with "expanded particles". Expandable particles are capable of being expanded, and expanded or pre-expanded particles have already been expanded to some degree from expandable particles. In the cited reference and as demonstrated in the examples of this cited reference, the expanded or pre-expanded particles are the porous particles, which

have a pentane content less than 2.0 percent by weight, and these porous particles are made from expandable particles having a pentane content ranging between 0.5 and 4.0 percent by weight, and preferably having a pentane content between 0.5 to 2.0 percent by weight. (See page 7, lines 10-18 of WO 00/15703.) These porous particles cannot be further expanded unless they are further impregnated with a blowing agent, i.e. inorganic blowing agent, or special equipment is used.

The Examiner further states: "The burden is shifted to the applicants to provide factual evidence to the contrary, i.e. that the particles disclosed by the reference and containing the disclosed amounts of the blowing agent (2 or 4%) are not inherently capable of being expanded to the claimed density in any conventional equipment at any conventionally used conditions." The Applicants once again emphasize that the porous particles of the cited reference are expanded or pre-expanded particles with a pentane content of less than 2.0 percent by weight. These porous particles do not and cannot contain pentane in an amount greater than 2.0% by weight since the purpose of the cited reference is to produce particles that initially contain an organic blowing agent in an amount sufficient to initially expand them, and thereafter to introduce an inorganic blowing agent for further expansion and/or molding.

Applicants submit herein an Declaration under 37 C.F.R. 1.132, which provides the factual evidence that the particles disclosed by the cited reference, WO 00/15703, are not inherently capable of being expanded into an article having the claimed densities in any conventional equipment at any conventionally used conditions without an additional amount of blowing agent

being incorporated into the expanded particles.

Additionally, page 12 of the cited reference states:

"Contrary to conventional high density polyvinylarene particles, the particles according to present invention are practically non-expandable. This means that when exposed to conventional expansion conditions, i.e. exposure to saturated steam over atmospheric pressure to reach a final temperature of 105°C for 30 seconds, the particles of the present invention expand to an apparent density, which is at most three times lower than do. Preferably, the particles according to the present invention expand under these conditions to a density of at most two times lower than do." The next paragraph on this same page 12 of the cited reference goes on to teach that in order to use the porous particles of the invention in the preparation of foamed articles, the porous particles need to be impregnated and preferably with an inorganic gas.

The Examiner makes the statement on page 4 of the Final Office Action that: "Further impregnation is only needed for additional expansion of the expanded particles." Applicants wish to note that these porous particles in this form have little or no practical utility, and the intent for these particles is to be further impregnated with an inorganic blowing agent for further expansion into articles of commercial use. The attached Declaration under 37 C.F.R. 1.132 makes it perfectly clear that the particles with the higher densities of the cited art have no real world applications.

The foamed particles of the claimed invention are made from expandable particles that initially contain an

organic blowing agent ranging from 3.0 to 9.0 % by weight. These expandable particles are then pre-expanded to a density ranging between 34.3 pounds to 12.5 pounds per cubic foot, which, in general, is a density less than 3 times the original destiny, and contain an organic blowing agent ranging between 2.5 and 5.0 % by weight. Due to the density of these foamed particles and the amount of blowing agent remaining therein, these foamed particles can be used in conventional equipment, e.g. a mold to form articles having a density ranging between 6.0 and .50 pounds per cubic foot, which are densities of commercial interest. That is, this density range is the required density for commercial products such as packaging, cups, and block, which may be used in building insulation.

The Examiner further states that: "In the alternative, from the teachings of illustrative and comparative examples, which only differ in the amounts of the blowing agent, one would easily conclude that the amount of the blowing agent governs the final expansion ratio. It would have been clearly within the routine experimentation conducted by an ordinary artisan to adjust the amount of the organic blowing agent to achieve the desired expansion ratio depending on the end use and particular needs for the specific expanded articles since this particular parameter is recognized as a result-effective variable, i.e. a variable which achieves a recognized result, in the reference."

It is certainly true that the amount of blowing agent does affect the expansion ratio, however, it does not govern the expansion ratio. The data shown in the attached Declaration under 37 C.F.R. 1.132 have shown

that the relationship between the amount of blowing agent and expansion ratio is highly non-linear, especially as the blowing agent content is reduced below ~2.5%. There is a significant drop-off in expansion ratio, so that the resulting foams are of such a high density as to have no end-use value. Alternatively, to achieve expansion ratios of commercial interest, other technology must be employed, e.g. reimpregnate the particles with additional blowing agent and/or use special equipment to do the expansion and final foam molding. Our claimed invention falls outside this area because the foamed particles are processable in conventional equipment.



Commonly Owned

Applicants further note that at the time of the present invention, the invention of the WO 00/15703 publication and the invention of the subject patent application were commonly owned by NOVA Chemicals Corporation. NOVA Chemicals Corporation is the parent company of NOVA Chemicals (International) S.A., which is the assignee of the WO 00/15703 publication and is also the parent company of NOVA Chemicals Inc., which is the assignee of the present application. Additionally, both the invention of the WO 00/15703 publication and the invention of the subject patent application are currently owned by the same party, NOVA Chemicals Corporation, which is the parent company of NOVA Chemicals (International) S.A. and NOVA Chemicals Inc.

Applicants wish to also point out that two of the inventors of the present invention are some of the same named inventors in the WO 00/15703 publication.


Summary and Conclusion

The attached Declaration under 37 C.F.R. 1.132 and the fact that both the invention of the subject patent application and that of WO 00/15703 were commonly owned and are currently owned by the same party should overcome the Examiner's rejection of the claims under 35 U.S.C. 102(a) or in the alternative under 35 U.S.C. 103(a) as obvious over WO 00/15703 to NOVA Chemicals.

Additionally, some of the claims in this case, including independent claim 1 have been amended to further distinguish the invention.

Applicants respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

  
Suzanne Kikel  
Agent for Applicant  
Reg. No. 28,230  
724 770-4339 - Phone  
724 770-5601 - Fax

Attachments